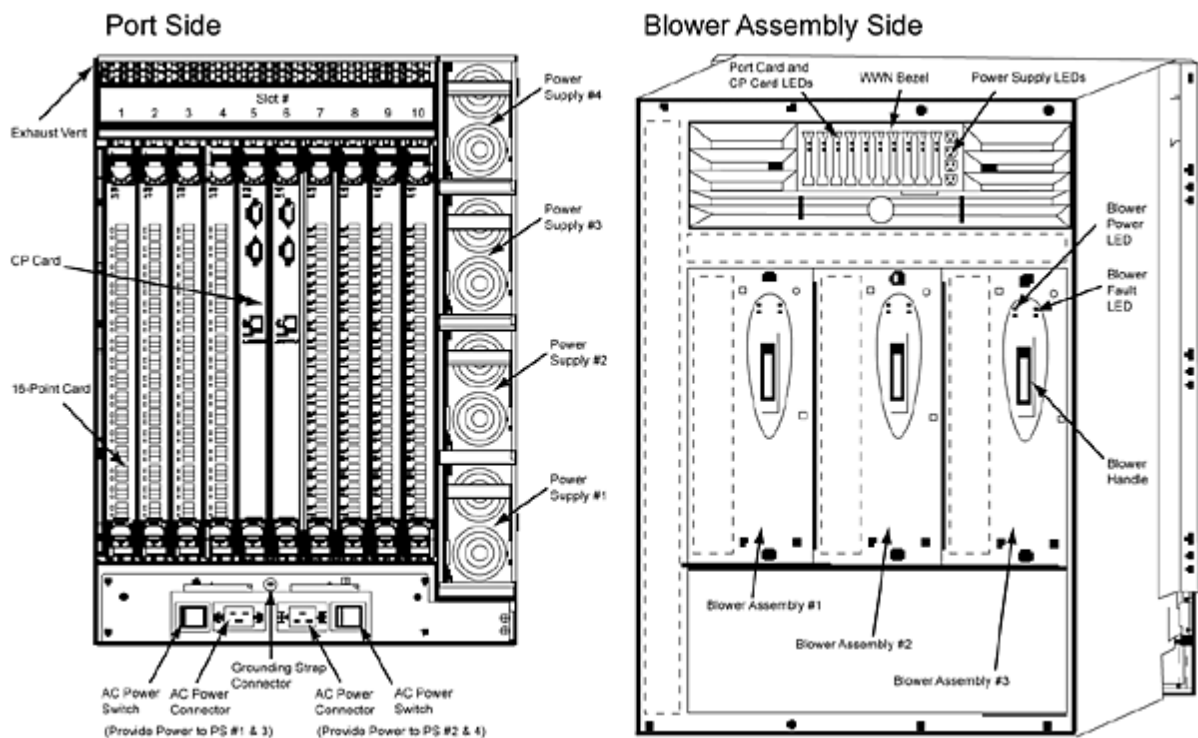


### Overview

The HP StorageWorks Core Switch 2/64 is a 2 Gb Fibre Channel core Fabric Switch that delivers high availability in a modular 14U enclosure, providing a foundation for an enterprise SAN that integrates seamlessly into an always-on Internet infrastructure. Scaling from 32-ports to 128-ports, the dual 64-port Core Switch 2/64 introduces new functionality via third-generation ASIC, which enables deployment of advanced fabric services via the Fabric OS.

The Core Switch 2/64 offers complete hardware redundancy with hot swap components. It comes with Advanced Zoning, and Web Tools. The Core Switch 2/64 can seamlessly connect to either 1 Gb or 2 Gb SAN devices by auto-sensing and speed-matching the Fibre Channel devices attached to it on a port-by-port basis. The Power Pack provides the SAN administrator with the tools to monitor the health and performance of the network. The Power Pack is available pre-configured on the switch or as an upgrade.

The Power Pack provides the SAN administrator with the necessary tools to monitor the health and performance of the network, while also ensuring the highest levels of security, scalability and manageability. Available pre-configured on the switch or as an upgrade, Power Pack also provides the foundation for integration into HP OpenView Storage Area Manager (SAM), enabling infrastructure management through a single-pane-of-glass. The Power Pack tools can be ordered separately, as well.



### Overview

### Key Features and Benefits

- **Reduced Total Cost of Ownership for SAN Infrastructure**
  - Enables storage consolidation, simplified management of data center SAN environment
- **Interoperability with the more than 1 MILLION port HP SAN Switch installed base**
- **Highest integration with HP Open View Storage Area Manager via:**
  - SAN Switch API
  - SAN Switch element managers
  - HP StorageWorks Fabric Manager
- **Broadest range of compatibility with SAN products**
  - Multi-vendor server and storage environment
  - Widest range of HP SAN solutions
  - Backward compatible with previously installed 1Gb SAN Switches
- **Flexible storage connectivity**
  - The only SAN solutions providing the complete HP SAN Switch functionality from Embedded to Enterprise. The HP SAN Switch value line products allows the capability to apply the complete SAN Switch functionality to an affordable entry level SAN deployment and then to grow that deployment to the largest SAN fabric solutions supported by HP.

### Models

HP StorageWorks Core Switch 2/64 and 2/64 PowerPak Models	StorageWorks Core Switch 2/64	332177-B22
	StorageWorks Core Switch 2/64 PowerPak	332178-B22
	StorageWorks Core Switch Blade	334883-B21
	PowerPak Software Upgrade Bundle	330882-B21

### Product Highlights

#### Core Switch 2/64 and 2/64 Power Pak

- Simplifies enterprise SAN deployment by combining high port density with exceptional scalability, performance, reliability and availability
- Delivers industry-leading port density with up to 128-ports in a single 14U enclosure and up to 256-ports in a single 42U cabinet, facilitating manageable SAN fabrics composed of thousands of ports
- Meets enterprise-level availability requirements with redundant, hot pluggable components, no single points of failure within the switch, and non-disruptive software upgrades
- Supports emerging storage networking technologies with a unique multi-protocol architecture
- Provides 1 Gb and 2 Gb operation today with seamless extension to 10 Gb in the future
- Employs optional Inter-Switch Link (ISL) Trunking (optional for base model) to provide a high-speed data path between switches.

#### Configuration Support

<http://h18000.www1.hp.com/products/storageworks/san/documentation.html>

#### High-availability features

- Redundant hot swappable Control Processors
- Redundant hot swappable N+1 cooling Fans (3 units Standard)
- Redundant, hot swappable power supplies (4 units Standard, 2 per switch)
- Enhanced Fault Detection Logic. Parity protection on all data paths and for system memory.

#### Advanced Fabric Services

- Optional ISL Trunking
- Hardware and Software Enforced Zoning
- Frame Filtering
- Optional End-to-End Performance Analysis

#### Power and Packaging

36U high HP StorageWorks Cabinets

42U high HP StorageWorks 9000 Cabinets

**NOTE:** Two Core switches are currently supported to ship configured to order from the factory in a HP StorageWorks 42U, 9000 cabinet.

**NOTE:** The Standard internal PDUs provided with HP StorageWorks cabinets CANNOT be used for the Core Switch 2/64 when configured in a HP StorageWorks 42U, 9000 series cabinet. Two 30 AMP, 200-240V, L6-30p PDUs are required per cabinet. The part number for the required 30 AMP PDU is E7681A (E7681-63001).

### Software Components, Standard

#### Frame Filtering

An ASIC based capability in the 2 Gb family of SAN switches that enables new applications and features. The switch has the ability to "view" the first 64-bytes of the Fibre Channel frame. At this time, Frame Filtering enables advanced capabilities such as Advanced Zoning and Advanced Performance Monitoring.

#### Advanced Zoning

In the 2Gb generation of switches, WWN Zoning and Access Control are enforced by hardware providing the same simple administration that was previously only enforced with software. Administrators can organize a physical fabric into logical groups and prevent unauthorized access by devices outside the Zone.

### Product Highlights

#### Web Tools

Enables organizations to monitor and manage single Fibre Channel switches and small SAN fabrics. Tasks can be performed through a Java-capable Web browser from a standard laptop, desktop PC or workstation from any location within the enterprise.

### Software Components, Optional

#### Core 2/64 Power Pack Software Bundle

Core 2/64 Power Pack Software Bundle includes:

- Fabric Watch
- Advanced Performance Monitor
- Remote Switch
- Extended Fabric
- ISL Trunking

#### Fabric Watch

Fabric Watch enables each switch to monitor the SAN for potential faults and automatically alert network managers to problems before they become failures. Fabric Watch tracks a variety of SAN fabric elements, events, and counters. Monitoring fabric-wide events, ports, SFPs, and environmental parameters permits early fault detection and isolation as well as performance measurement. Each switch in the SAN needs its' own Fabric Watch license.

#### Advanced Performance Monitor

This enabling technology provides the ability to monitor and watch specific fabric metrics from a SID (Source ID) to a DID (Destination ID), creating a method to be able to fine-tune and scale your fabric more efficiently. Plus, Advanced Performance Monitoring includes the ability for early warning detection of hot spots within the fabric, a powerful tool for maintaining overall balanced performance.

#### Remote Switch

Remote switch fabric functions with the aid of a bridging device or network bridge. The network bridge supports both Fibre Channel physical interfaces as well as secondary non-Fibre Channel FCIP physical interface.

#### Extended Fabric

Extends all of the scalability, reliability, and performance benefits of Fibre Channel Storage Area Networks (SANs) beyond the native 10 km distance specified by the Fibre Channel standard.

#### ISL Trunking

For high performance enhanced Trunking, this optional license logically groups up to four E-ports to provide a high bandwidth trunk between two switches. Each 2 Gb switch needs its own license. The switch operating system views the trunk as a single, high bandwidth resource (up to 8 Gb) when routing connections between switches. Connections are load-balanced across the individual links, which comprise the logical trunk group. Each 8-port switch can have a total of two separate 4-port Trunk groups.

#### Fabric Manager v4.1.1

Fabric Manager is a highly scalable, Java-based application that manages multiple switches and multiple fabrics (up to eight) in real time, helping SAN administrators with SAN configuration, monitoring, dynamic provisioning, and daily management. SAN administrators gain rapid access to critical SAN information across multiple personality fabrics, including both Fabric OS SANs and enhanced Secure Fabric OS SANs.

### Product Highlights

#### Fabric Manager v3 to v4.1.1 Upgrade

Fabric Manager v4.1.1 license upgrade for customers who previously purchased Fabric Manager v3.  
**NOTE:** Fabric Manager v3 to v4.1.1 Upgrade is optional for Core Switch 2/64 and Core Power Pak.

#### Secure Fabric OS

Secure Fabric OS™ is available only on the B-Series platform and is the only solution that provides protection for both management access and switch-to-switch authentication. This comprehensive security solution for SAN fabrics provides policy-based security protection for more predictable change management, assured configuration integrity and reduced risk of downtime. Secure Fabric OS protects the network by using the strongest, enterprise-class security methods available, including digital certificates and digital signatures, multiple levels of password protection, strong password encryption and Public Key Infrastructure (PKI)-based authentication, and 128-bit encryption of the switch's private key used for digital signatures. With its flexible design, Secure Fabric OS enables organizations to customize SAN security to meet specific policy requirements. In addition, Secure Fabric OS works in conjunction with Advanced Zoning to further secure access to the SAN, simplify storage management, and reduce provisioning time.

### Service and Support, HP Care Pack, and Warranty Information

#### Warranty

(1-1-1) Hardware Warranty – One-year on-site warranty, 8x5, next business day response, installation not included.

**NOTE:** The hardware warranty covers firmware and embedded non-saleable software. Saleable software carries its own warranty, see below.

Software Warranty – HP warrants only that the software media will be free of physical defects for a period of ninety (90) days from delivery. EXCLUSIVE REMEDY. The entire liability of HP and its suppliers and your exclusive remedy for software that does not conform to this Limited Warranty shall be the repair or replacement of the defective media. This warranty and remedy are subject to your returning the defective media during the warranty period to HP in the country in which you obtained the software.

#### HP Service & Warranty Support

HP Service & Warranty Support Additional Warranty protection and/or HP Installation packages can be purchased.

**NOTE:** Certain restrictions and exclusions apply. Consult the Customer Support Center for details. HP provides a one-year, hardware limited warranty, fully supported by a worldwide network of resellers and service providers.

In addition, available service offerings include a full range of HP Care Pack packaged hardware and software services:

- Installation
- Extended coverage hours and enhanced response times
- System management and performance services

For more information on warranty and support options, please visit our Web site at:

<http://www.hp.com/hps/tech/storage/supp/>.

#### Software Product Services

- Stand-alone telephone support
- Rights to new license version
- Media and documentation updates

#### Hardware Product Services

- Installation services
- On-site maintenance (includes warranty support)
- Response time upgrades during the warranty period
- Post-warranty coverage

#### HP Care Pack Services Warranty Upgrade Options

Service offerings include a full range of Customer HP Care Pack services for both hardware and software services:

- Response – Upgrade on-site response from next business day to same day 4-hours
- Coverage – Extend hours of coverage from 5 days x 9 hours to 7 days x 24 hours
- Duration – Select duration of coverage for a period of 1, 3, or 5 years

Additional Warranty protection and/or HP Installation packages can be purchased.

**NOTE:** Certain restrictions and exclusions apply. Consult the HP Customer Support Center for details

### *Service and Support, HP Care Pack, and Warranty Information*

**HP Care Pack Information** HP Care Pack is defined as an upgrade to the product warranty attribute, available for a specific duration and hours of coverage.

- HP Care Pack is not available for less than the product's warranty duration.
- HP Care Pack is available for sale anytime during the warranty period for most products, but the commencement date will be the same as the Warranty Start Date (delivery date to end user customer). Proof of purchase may be required.
- HP Care Pack services are prepaid.

For additional HP Care Pack (hardware & software) information, as well as orderable part numbers, please refer to the URL listed below:

<http://h18005.www1.hp.com/services/carepag/index.html>

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### **Additional Services**

Implementation service, SAN Architecture service. For more information on service options, please visit our Web site at: <http://www.hp.com/go/san>.

### Family Information

Features	MSA SAN Switch 2/8 (embedded switch)	SAN Switch 2/16	SAN Switch 2/32	SAN Core 2/64
Targeted environment	Workgroups, Departments	Departments, Data Centers	Departments, Data Centers	Data Centers
Port bandwidth	2 Gb/sec	2 Gb/sec	2 Gb/sec	2 Gb/sec
Aggregate device bandwidth	32 Gb/sec end-to-end	32 Gb/sec	64Gb/sec	128 Gb/sec
OS support	<b>NOTE:</b> Please refer to SAN Design Guide pointer at: <a href="http://www.compaq.com/products/StorageWorks/san/documentation.html">http://www.compaq.com/products/StorageWorks/san/documentation.html</a>			
"QuickLoop" emulation		Yes (Included)	No	No
Storage system support	MSA1000	MA8000 EMA12000/16000, EVA, XP, VA	MA8000 EMA12000/16000, EVA, XP, VA	MA8000 EMA12000/16000, EVA, XP, VA
Ports	7 external 1 internal	16 SFP	32 SFP	32 SFP Base 64 Total
Cascading support	Yes	Yes	Yes	Yes
Advanced Trunking	Optional	Optional	Optional	Optional
Form factor	Embedded	1U	1.5U	14U
Zoning software	Yes (Included)	Yes (Included)	Yes (Included)	Yes (Included)
Hot plug, redundant power supplies	No	Yes	Yes	Yes
Hot plug fans	No	Yes	Yes	Yes
Enterprise Backup Solution (EBS) support**	Yes	Yes	Yes	Yes

**\*\*NOTE:** Requires correct Host Bus Adapter. Not all Operating Systems Supported.

### Configuration Information

#### Step 1 – Base Configuration and PowerPak

Select one:

Model	Model Description	Part Number
StorageWorks Core Switch 2/64 base configuration	32-port Fibre Channel Fabric Core Switch with rack rails, Zoning, WebTools.	332177-B22
StorageWorks Core Switch 2/64 PP configuration	32 port Fibre Channel Fabric Core Switch with rack rails, Zoning, WebTools, Fabric Watch, Advanced Performance Monitor, Remote Switch, Extended Fabric, ISL Trunking.	332178-B22

#### Step 2 – Additional Port Configurations

	Model Description	Quantity	Part Number
Core Switch Blade	16-port Core Switch Blade <b>NOTE:</b> Requires optical transceivers for each port as listed below.	Add the appropriate quantity of 16-port blades to meet requirements.	334883-B21
Add Software:	Power Pack Software Bundle for 2/64		330882-B21
Optional Software	Remote Switch		330883-B21
	Extended Fabrics		325886-B21
	ISL Trunking		325887-B21
	Fabric Manager, v4.x Base 10 domains		A7390A
	Fabric Manager, v4.x Enterprise 200 domains, 8 fabrics		A7389A
	Fabric Manager, v3 to v4.x upgrade		A7391A
	Fabric Manager v4 base to v4.x enterprise upgrade license		A7392A
	Advanced Performance Monitor		334219-B21
	Fabric Watch		334218-B21
	Secure Fabric OS		332926-B21

#### Step 3 – Additional Options

Optical Transceivers	Short Wave, 300M, 2X, FC	A6515A
	Long Wave (10 km)	A6516A
	Long Wave (35 km)	300836-B21

Configuration Information

2 Gb optical cables	<i>LC-LC for between two 2 Gb devices</i>	
	2 m LC-LC Multi-Mode Fibre Channel Cable	221692-B21
	5 m LC-LC Multi-Mode Fibre Channel Cable	221692-B22
	15 m LC-LC Multi-Mode Fibre Channel Cable	221692-B23
	30 m LC-LC Multi-Mode Fibre Channel Cable	221692-B26
	50 m LC-LC Multi-Mode Fibre Channel Cable	221692-B27
	<i>LC-SC for between a 1 Gb and a 2 Gb device</i>	
	2 m LC-SC Multi-Mode Fibre Channel Cable	221691-B21
	5 m LC-SC Multi-Mode Fibre Channel Cable	221691-B22
	15 m LC-SC Multi-Mode Fibre Channel Cable	221691-B23
	30 m LC-SC Multi-Mode Fibre Channel Cable	221691-B26
	50 m LC-SC Multi-Mode Fibre Channel Cable	221691-B27

Fibre Channel Standards And Revisions	FC-FG Rev 3.5	FC-AL Rev. 4.5	FC-FLA Rev 2.7	FC-PLDA Rev 2.1	FC-VI Rev 1.5
	FC-PH-2 Rev 7.4	FC-GS-2 Rev 5.3	FC-PH-3 Rev 9.4	FC-SW Rev 3.3	IPFC RFC 2625
	FC-AL-2 Rev. 7.0	FC-PH Rev 4.3			

### Technical Specifications

Fibre Channel ports	128 universal ports												
Control processor	Redundant (active/standby) control processor modules												
Scalability	Full fabric architecture: <a href="http://h18006.www1.hp.com/products/storageworks/san/documentation.html">http://h18006.www1.hp.com/products/storageworks/san/documentation.html</a>												
Performance	1.063 Gb line speed, full duplex; 2.125 Gb line speed, full duplex; auto-sensing of 1 Gb and 2 Gb port speeds; optionally programmable to fixed port speed; speed matching between 1 Gb and 2 Gb ports												
Certified maximum	Refer to SAN Design Guide <a href="http://h18006.www1.hp.com/products/storageworks/san/documentation.html">http://h18006.www1.hp.com/products/storageworks/san/documentation.html</a> .												
Interoperability	SAN Switch 8, SAN Switch 16, SAN Switch 8-EL, SAN Switch 16-EL, Integrated /32, Integrated /64 (not currently supported).												
Switch core	Non-blocking												
Fabric latency	<2 $\mu$ sec. with no contention, cut-through routing												
Hardware options	16-port blades, SFP media												
ISL Trunking	Up to four 2.125 Gb ports per ISL trunk; to 8.5 Gb per ISL Trunk												
Aggregate bandwidth	512 Gb end-to-end												
Switch latency	<2.1 $\mu$ sec any port to any port at 2 Gb, cut-through routing												
Maximum frame size	2112-byte payload												
Frame buffers	108 per 4-port group, dynamically allocated												
Classes of service	Class 2, Class 3, Class F (inter-switch frames)												
Port types	FL_port, F_port, and E_port; self-discovery based on switch type (U_Port); optional port type control												
Data traffic types	Fabric Switches supporting unicast, multicast (255 groups), and broadcast												
Media types	Hot pluggable, industry-standard small form factor pluggable (SFP), LC connector; Short-Wavelength Laser (SWL), up to 1,640 ft/500 m; Long-Wavelength Laser (LWL), up to 6.2 mi/10 km; distance depends on fiber optic cable and port speed (optional)												
Laser	Short-wave up to 1,640 ft (500 m); long-wave up to 6.2 mi (10 km) when available												
Fabric services	Simple Name Server; Registered State Change Notification (RSCN); Alias Server (multicast); Advanced Zoning; WebTools; Fabric Watch; ISL Trunking (optional); Advanced Performance Monitoring.												
High Availability	<table><tr><td>Control Processor</td><td>Redundant (active/standby) control processor modules; automatic failover; non-disruptive software upgrades; dual-flash memory on each control processor to store two software images</td></tr><tr><td>Modules</td><td>Hot swappable</td></tr><tr><td>Backplane</td><td>Fully passive</td></tr><tr><td>Input power</td><td>Dual AC inputs</td></tr><tr><td>Chassis power</td><td>Four AC-DC power supply modules, 2N redundant</td></tr><tr><td>Cooling</td><td>Three blower assembly modules (two operational required)</td></tr></table>	Control Processor	Redundant (active/standby) control processor modules; automatic failover; non-disruptive software upgrades; dual-flash memory on each control processor to store two software images	Modules	Hot swappable	Backplane	Fully passive	Input power	Dual AC inputs	Chassis power	Four AC-DC power supply modules, 2N redundant	Cooling	Three blower assembly modules (two operational required)
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Modules	Hot swappable												
Backplane	Fully passive												
Input power	Dual AC inputs												
Chassis power	Four AC-DC power supply modules, 2N redundant												
Cooling	Three blower assembly modules (two operational required)												
Management	Telnet; SNMP (FE MIB, FC Management MIB); Web Tools; Fabric Watch Optional; Fabric Access layer												
Management access	10/100 Ethernet (RJ-45), in-band over Fibre Channel (requires fabric); two serial ports (DB-9) per control processor module												
Diagnostics	POST and embedded online/offline diagnostics												

### Technical Specifications

<b>Supported software</b>		<ul style="list-style-type: none"> <li>• Telnet, SNMP</li> <li>• WebTools</li> <li>• Zoning</li> <li>• Fabric Watch (optional)</li> <li>• Fabric Manager 3.0</li> </ul>
<b>Mechanical Specifications</b>	<b>Mounting</b>	Rackmountable in a standard 19-inch (48.26 cm) EIA rack; Telco-style mid-mounting available
	<b>Ports per rack</b>	Up to 256-ports per 42U rack
	<b>Enclosure</b>	Rear panel-to-door airflow
	<b>Height</b>	24.11 in (61.24 cm), 14U
	<b>Width</b>	17.22 in (43.74 cm)
	<b>Depth (without door)</b>	27.90 in (70.90 cm)
	<b>Depth (with door)</b>	29.20 in (74.20 cm)
<b>Dimensions</b>	<b>Weight</b>	215 to 250 lb (98 to 113 kg)
	<b>Temperature</b>	<b>Operating</b> 50° to 104° F (10° to 40° C)
	<b>Humidity</b>	<b>Operating</b> 20% to 85% non-condensing at 104° F (40° C)
	<b>Altitude</b>	0 to 3 km
	<b>Shock</b>	20 g, 6 ms, half sine
	<b>Vibration</b>	<b>Operating</b> 0.5 g p-p, 5 to 500 Hz <b>Non-operating</b> 2.0 g, 5 to 500 Hz
	<b>Heat dissipation</b>	1960 Watts (6700 BTU/hour) fully loaded
<b>Environment</b>	<b>Supported power range</b>	<b>Nominal</b> 200–240 VAC, single phase
		<b>Operational</b> 180–264 VAC, auto-sensing
		<b>Minimum</b> 2300 Volt-amps
		<b>Maximum</b> 12 Amps
		<b>In-rush current</b> 40A maximum, < ¼ AC cycle, per AC unit
	<b>Frequency</b>	47 to 63 Hz
<b>Power</b>		

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